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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/713,833	11/14/2003	William James Moore	SP-1756.1US	2557
20875	7590	05/16/2007		
MICHAEL C. POPHAL EVEREADY BATTERY COMPANY INC 25225 DETROIT ROAD P O BOX 450777 WESTLAKE, OH 44145			EXAMINER LEWIS, BEN	
			ART UNIT 1745	PAPER NUMBER
			MAIL DATE 05/16/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/713,833

Applicant(s)

MOORE ET AL.

Examiner

Ben Lewis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 and 24-47 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-16 and 24-47 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- ☐ Notice of Informal Patent Application
- ☐ Other: ____.

DETAILED ACTION

Response to Amendment

This office action is response to amendment filed on February 26th, 2007.

Claims 1-16 and 24-47 are pending. Claims 17-23 have been cancelled. Applicant's arguments are persuasive. Claims 1-16 and 24-47 are rejected for reasons below not necessitated by applicant's amendments.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4, 9-13, 16, 40-44 and 47 rejected under 35 U.S.C. 103(a) as being unpatentable over Malservisi et al. (U.S. Pub. No. 2004/0115532 A1) in view of Tada et al. (U.S. Patent No. 5,209,995).

With respect to claims 1, 9, 12, 40 and 43, Malservisi et al disclose zinc powders for use in electrochemical cells (title). Malservisi et al. also disclose, an LR-06 electrochemical cell comprising a positive terminal fabricated from a conductive

material, a manganese dioxide cathode in electrical contact with the positive terminal, an anode comprising a battery grade zinc powder, the zinc powder being suspended in a gelled KOH electrolyte, a separator electronically separating the cathode and the anode, and a current collector inserted into the anode (Paragraph 0023).

With respect to the electrode having less than 50ppm of mercury, Malservisi et al teach that alkaline cell technology has evolved significantly over the past 10 years or so. For instance, lower mercury and mercury-free cells were introduced in the 90's (Paragraph 0003).

With respect to the zinc powder having a tap density greater than 2.8g/cc and less than 3.65g/cc, Malservisi et al. teach the use of a battery grade zinc powder comprising stranded particles fabricated from a zinc metal, the stranded particles having a tap density of at most about 3.2 g/cc, preferably at most about 2.8 g/cc (Paragraph 0015).

With respect to the zinc powder occupying less than 28.0 volume percent of said second electrodes volume. Malservisi et al. teach that two varieties of gelled anodes were fabricated, the first comprising 67% by weight zinc powder and 33% by weight gelled electrolyte and the second comprising 62% by weight zinc powder and 38% by weight gelled electrolyte. The control anode was fabricated from 67% by weight zinc powder and 33% by weight of gelled electrolyte. The gelled electrolyte comprised 98% by weight of KOH 40%/ZnO 3% and 2% by weight of polyacrylic acid (Carbopol TM 940) as gelling agent (Paragraph 0080-0081).

$$\rho_{\text{(Zinc)}} = 7.14\text{g/cc}, \rho_{\text{(KOH 40\%)}} = 1.39\text{g/cc}, \rho_{\text{(ZnO)}} = 5.6\text{g/cc}, \rho_{\text{(Carbopol 940)}} = 1.41\text{g/cc}$$

Basis = 100g anode material

Volume Zn = $62\text{g} / \rho_{\text{(Zinc)}} = 8.6\text{cc}$, Volume KOH = $(0.98 * 38\text{g}) / \rho_{\text{(KOH)}} = 27.9\text{cc}$

Volume Carbopol 940 = $(0.02 * 38\text{g}) / \rho_{\text{(carbopol 940)}} = 0.54\text{cc}$

Volume % Zinc = $(\text{Vol zn} / \square \text{Vol}) \times 100 = 23.2 \text{ vol \% zinc}$

With respect to the BET surface area being greater than $400 \text{ cm}^2/\text{g}$, Malservisi et al do not disclose BET specific surface area data. However, Tada et al. recognize the benefit of changing the surface area of zinc particles. Tada et al. disclose zinc alkaline cells (title) wherein If the bulk specific gravity of the zinc alloy powder would be less than 2.90 (grams per cm^3), on the one hand, the action of suppressing gases from generating may be reduced because the shapes of the zinc alloy powder particles may become so nearly acicular that the specific surface area of the zinc alloy powder particles becomes large enough to make their reactivity too high. If the bulk specific gravity thereof would be larger than 3.50 (grams per cm^3), on the other hand, the discharge performance may be lowered because the shapes of the zinc alloy powder particles become so nearly spherical that their surface area becomes smaller, thereby making their reactivity too low (Col 2 lines 40-54). Therefore, it would have been within the skill of the ordinary artisan to change the surface area of the zinc particles of Malservisi et al. such that the surface area is within the range of that claimed by applicant in order to provide sufficient reactivity. *Discovery of optimum value of result effective variable in known process is ordinarily within skill of art.* In re Boesch, CCPA 1980, 617 F.2d 272, 205 USPQ215.

With respect to claims 2-4, Malservisi et al. teach that two varieties of gelled anodes were fabricated, the first comprising 67% by weight zinc powder and 33% by weight gelled electrolyte and the second comprising 62% by weight zinc powder and 38% by weight gelled electrolyte. The control anode was fabricated from 67% by weight zinc powder and 33% by weight of gelled electrolyte. The gelled electrolyte comprised 98% by weight of KOH 40%/ZnO 3% and 2% by weight of polyacrylic acid (Carbopol TM 940) as gelling agent (Paragraph 0080-0081).

$$\rho_{\text{(Zinc)}} = 7.14\text{g/cc}, \rho_{\text{(KOH 40\%)}} = 1.39\text{g/cc}, \rho_{\text{(ZnO)}} = 5.6\text{g/cc}, \rho_{\text{(Carbopol 940)}} = 1.41\text{g/cc}$$

Basis = 100g anode material

$$\text{Volume Zn} = 62\text{g} / \rho_{\text{(Zinc)}} = 8.6\text{cc}, \text{Volume KOH} = (0.98 * 38\text{g}) / \rho_{\text{(KOH)}} = 27.9\text{cc}$$

$$\text{Volume Carbopol 940} = (0.02 * 38\text{g}) / \rho_{\text{(carbopol 940)}} = 0.54\text{cc}$$

$$\text{Volume \% Zinc} = (\text{Vol zn} / \square \text{Vol}) \times 100 = 23.2 \text{ vol \% zinc}$$

With respect to claims 41-42, Malservisi et al. teach the use of a battery grade zinc powder comprising stranded particles fabricated from a zinc metal, the stranded particles having a tap density of at most about 3.2 g/cc, preferably at most about 2.8 g/cc (Paragraph 0015). Malservisi et al. teach that two varieties of gelled anodes were fabricated, the first comprising 67% by weight zinc powder and 33% by weight gelled electrolyte and the second comprising 62% by weight zinc powder and 38% by weight gelled electrolyte. The control anode was fabricated from 67% by weight zinc powder

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and 33% by weight of gelled electrolyte. The gelled electrolyte comprised 98% by weight of KOH 40%/ZnO 3% and 2% by weight of polyacrylic acid (Carbopol TM 940) as gelling agent (Paragraph 0080-0081).

Malservisi et al do not disclose resistivity data. However, it is the position of the examiner that such properties are inherent, given that Malservisi et al and the present application utilize the same materials and same anode composition. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. In re Robertson, 49 USPQ2d 1949 (1999).

With respect to claims 10-11, Malservisi et al. teach the use of a battery grade zinc powder comprising stranded particles fabricated from a zinc metal, the stranded particles having a tap density of at most about 3.2 g/cc, preferably at most about 2.8 g/cc (Paragraph 0015).

With respect to claims 13 and 44, Malservisi et al. teach the use of a battery grade zinc powder comprising stranded particles fabricated from a zinc metal, the stranded particles having a tap density of at most about 3.2 g/cc, preferably at most about 2.8 g/cc (Paragraph 0015). Malservisi et al. teach that two varieties of gelled anodes were fabricated, the first comprising 67% by weight zinc powder and 33% by

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weight gelled electrolyte and the second comprising 62% by weight zinc powder and 38% by weight gelled electrolyte. The control anode was fabricated from 67% by weight zinc powder and 33% by weight of gelled electrolyte. The gelled electrolyte comprised 98% by weight of KOH 40%/ZnO 3% and 2% by weight of polyacrylic acid (Carbopol TM 940) as gelling agent (Paragraph 0080-0081).

Malservisi et al do not disclose any KOH absorption data. However, it is the position of the examiner that such properties are inherent, given that Malservisi et al and the present application utilize the same materials and same anode composition. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. In re Robertson, 49 USPQ2d 1949 (1999).

With respect to claims 16 and 47, Malservisi et al. teach that the zinc powder comprises particles fabricated from a zinc alloy, the alloy consisting essentially of zinc, aluminum, bismuth and indium (Paragraph 0018). For ppm values see Table 4.

TABLE 4

Atomization process	Alloy Chemistry (ppm)				ZnO	
	Al	Bi	In	Pb	ZnO (%)	Ratio to Reference
Impulse atomisation	50	100	200		0.03	0.25
process (strand shaped)	70	100	200		0.04	0.33
	60	100	200		0.03	0.25
	75	100	200		0.02	0.17
Conventional air atomisation	100	100	200		0.12	1
Impulse atomisation		300	300		0.08	0.15
process (strand shaped)		300	300		0.16	0.30
		300	300		0.09	0.17
Conventional air atomisation		300	300		0.54	1

3. Claims 24, 25, 30, 31, 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Malservisi et al. (U.S. Pub. No. 2004/0115532 A1) in view of Tada et al. (U.S. Patent No. 5,209,995).

With respect to claims 24, 25, 30, 31, 35 and 36, Malservisi et al disclose zinc powders for use in electrochemical cells (title). Malservisi et al. also disclose, an LR-06 electrochemical cell comprising a positive terminal fabricated from a conductive material, a manganese dioxide cathode in electrical contact with the positive terminal, an anode comprising a battery grade zinc powder, the zinc powder being suspended in a gelled KOH electrolyte, a separator electronically separating the cathode and the anode, and a current collector inserted into the anode (Paragraph 0023).

With respect to the electrode having less than 50ppm of mercury, Malservisi et al teach that alkaline cell technology has evolved significantly over the past 10 years or so. For instance, lower mercury and mercury-free cells were introduced in the 90's (Paragraph 0003).

With respect to the zinc powder having a tap density greater than 2.8g/cc and less than 3.65g/cc, Malservisi et al. teach the use of a battery grade zinc powder comprising stranded particles fabricated from a zinc metal, the stranded particles having a tap density of at most about 3.2 g/cc, preferably at most about 2.8 g/cc (Paragraph 0015).

With respect to the zinc powder occupying less than 28.0 volume percent of said second electrodes volume. Malservisi et al. teach that two varieties of gelled anodes were fabricated, the first comprising 67% by weight zinc powder and 33% by weight gelled electrolyte and the second comprising 62% by weight zinc powder and 38% by weight gelled electrolyte. The control anode was fabricated from 67% by weight zinc powder and 33% by weight of gelled electrolyte. The gelled electrolyte comprised 98% by weight of KOH 40%/ZnO 3% and 2% by weight of polyacrylic acid (Carbopol TM 940) as gelling agent (Paragraph 0080-0081).

$$\rho_{\text{(Zinc)}} = 7.14\text{g/cc}, \rho_{\text{(KOH 40\%)}} = 1.39\text{g/cc}, \rho_{\text{(ZnO)}} = 5.6\text{g/cc}, \rho_{\text{(Carbopol 940)}} = 1.41\text{g/cc}$$

Basis = 100g anode material

$$\text{Volume Zn} = 62\text{g} / \rho_{\text{(Zinc)}} = 8.6\text{cc}, \text{Volume KOH} = (0.98 * 38\text{g}) / \rho_{\text{(KOH)}} = 27.9\text{cc}$$

$$\text{Volume Carbopol 940} = (0.02 * 38\text{g}) / \rho_{\text{(carbopol 940)}} = 0.54\text{cc}$$

$$\text{Volume \% Zinc} = (\text{Vol zn} / \square \text{Vol}) \times 100 = 23.2 \text{ vol \% zinc}$$

Malservisi et al. does not specifically teach that the second electrode comprises no more than 4.3 grams of zinc powder. However, it would have been obvious to one of ordinary skill in the art to produce an electrode with the amount of zinc powder as claimed by applicant at the time the invention was made because the amount of electrode active material in batteries vary according to the required battery capacity.

With respect to the cell OCV, Malservisi et al. teach the use of a battery grade zinc powder comprising stranded particles fabricated from a zinc metal, the stranded particles having a tap density of at most about 3.2 g/cc, preferably at most about 2.8 g/cc (Paragraph 0015). Malservisi et al. also teach that a given mixture is comprised of

two or more types of zinc powders made by impulse atomisation or by impulse atomisation and conventional techniques and having different particle shapes and/or particle sizes distributed around different mean particle sizes which are then combined to form a hybrid powder. By adjusting the powder mix in terms of both particle size and shape the performance characteristics of a given electrochemical cell can be optimized (Paragraph 0084). The fine air atomised powder has a particle size distribution where 100% of the particles are less than $75\mu\text{m}$ and the conventional air atomised powder has a particle size distribution within $425\mu\text{m}$ and $54\mu\text{m}$ (Paragraph 0085).

Malservisi et al do not disclose discharging and OCV data. However, it is the position of the examiner that such properties are inherent, given that Malservisi et al and the present application utilize zinc powders with the same particle sizes and tap density and with same materials with the same composition. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. In re Robertson, 49 USPQ2d 1949 (1999).

With respect to the BET surface area being greater than $400\text{ cm}^2/\text{g}$, Malservisi et al do not disclose BET specific surface area data. However, Tada et al. recognize the benefit of changing the surface area of zinc particles. Tada et al. disclose zinc alkaline cells (title) wherein If the bulk specific gravity of the zinc alloy powder would be less than 2.90 (grams per cm^3), on the one hand, the action of suppressing gases from generating may be reduced because the shapes of the zinc alloy powder particles may become so nearly acicular that the specific surface area of the zinc alloy powder

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particles becomes large enough to make their reactivity too high. If the bulk specific gravity thereof would be larger than 3.50 (grams per cm.^{sup.3}), on the other hand, the discharge performance may be lowered because the shapes of the zinc alloy powder particles become so nearly spherical that their surface area becomes smaller, thereby making their reactivity too low (Col 2 lines 40-54). Therefore, it would have been within the skill of the ordinary artisan to change the surface area of the zinc particles of Malservisi et al. such that the surface area is within the range of that claimed by applicant in order to provide sufficient reactivity. *Discovery of optimum value of result effective variable in known process is ordinarily within skill of art. In re Boesch*, CCPA 1980, 617 F.2d 272, 205 USPQ215.

4. Claims 5-8, 14-15, 26-29, 32-34, 37-39 and 45-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Malservisi et al. (U.S. Pub. No. 2004/0115532 A1) in view of Tada et al. (U.S. Patent No. 6,436,539 B1) and further in view of Armacanqui et al. (U.S. Pub. No. 2004/0033418).

With respect to claims 5-7, 26-29, 32-34, 37-39, Malservisi et al. as modified by Tada et al. disclose zinc powders for use in electrochemical cells (title) in paragraphs 2 and 7 above. Malservisi et al. as modified by Tada et al. do not specifically teach using potassium hydroxide solution that is 36%, 34% or 32% by weight potassium hydroxide. However, Armacanqui et al. discloses an alkaline cell with performance enhancing additives (title) wherein, Armacanqui et al. teach that the present invention recognizes that advantages may be achieved in a cell whose electrolyte has a concentration of

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the missing feature is necessarily present in that which is described in the reference. In re Robertson, 49 USPQ2d 1949 (1999).

5. With respect to claims 14-15 and 45-46, the disclosure Malservisi et al as modified by Tada et al. differs from Applicant's claims in that Malservisi et al. as modified by Tada et al. do not disclose that D_{50} is between 100 and 130 μm or between 110 and 120 μm . However, Malservisi et al. as modified by Tada et al. recognize that adjusting the powder mix in terms of both particle size and shape the performance characteristics of a given electrochemical cell can be optimized (Paragraph 0084).

Improved performance characteristics may also be derived from mixtures of the above produced zinc alloy powders. A given mixture is comprised of two or more types of zinc powders made by impulse atomisation or by impulse atomisation and conventional techniques and having different particle shapes and/or particle sizes distributed around different mean particle sizes which are then combined to form a hybrid powder. By adjusting the powder mix in terms of both particle size and shape the performance characteristics of a given electrochemical cell can be optimized (Paragraph 0084). The fine air atomised powder has a particle size distribution were 100% of the particles are less than 75 μm and the conventional air atomised powder has a particle size distribution within 425 μm and 54 μm (Paragraph 0085).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use zinc particles where D_{50} is between within the applicants claimed particle size range in order improve the performance of the

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30% to 40%. Furthermore, as is discussed in more detail below, cell performance may enhanced using an anode gel having a KOH concentration between 20% and 30% (Paragraph 0041). Therefore it would have been obvious to one of ordinary skill in the art at time the invention was made use the electrolyte of Armancanuqui et al. in the battery of Malservisi et al. as modified by Tada et al. because Armacanuqui et al. teach that cell performance is particularly enhanced when the KOH concentration is between 30% and 40% (Paragraph 0044).

With respect to claim 8, Malservisi et al. teach the use of a battery grade zinc powder comprising stranded particles fabricated from a zinc metal, the stranded particles having a tap density of at most about 3.2 g/cc, preferably at most about 2.8 g/cc (Paragraph 0015). Malservisi et al. teach that two varieties of gelled anodes were fabricated, the first comprising 67% by weight zinc powder and 33% by weight gelled electrolyte and the second comprising 62% by weight zinc powder and 38% by weight gelled electrolyte. The control anode was fabricated from 67% by weight zinc powder and 33% by weight of gelled electrolyte. The gelled electrolyte comprised 98% by weight of KOH 40%/ZnO 3% and 2% by weight of polyacrylic acid (Carbopol TM 940) as gelling agent (Paragraph 0080-0081).

Malservisi et al do not disclose resistivity data. However, it is the position of the examiner that such properties are inherent, given that Malservisi et al and the present application utilize the same materials and same anode composition. A reference which is silent about a claimed invention's features is inherently anticipatory if

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electrochemical cell. *Discovery of optimum value of result effective variable in known process is ordinarily within skill of art.* In re Boesch, CCPA 1980, 617 F.2d 272, 205 USPQ215.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited references include general teachings and relevant features as to the state of the art at the time of the invention.

U.S. Patent No. 6,991,875 B2

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben Lewis whose telephone number is 571-272-6481.

The examiner can normally be reached on 8:30am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ben Lewis

Patent Examiner
Art Unit 1745


SUSYTSANG-FOSTER
PRIMARY EXAMINER